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14. ABSTRACT
Purpose: To describe the relationship between the domains of Total Force Fitness (TFF) and explore the relationship between potential and realized access in military personnel completing

the 2010 Behavioral Risk Factor Surveillance System Survey (BRFSS). Design: Descriptive-exploratory study using secondary analysis of 2010 BRFSS data. Methods: The sample was created by extracting data for all 2010 BRFSS participants responding "yes" to "currently being active duty" (AD) or "Reserves/National Guard" (RNG) on the Veteran Status demographic question. Sample: 6134 respondents (1415 AD and 4719 RNG) to the 2010 BRFSS. Analysis: Independent samples Chi-square and Mann-Whitney U were used to conduct bivariate analyses. Multiple logistic regression was used to determine the extent to which measures of potential access predicted measures of realized access. To obtain accurate variance estimates under the BRFSS complex survey design, data were analyzed using the IBM-SPSS Complex Samples Module (version 20, IBM, Chicago, IL). Significance level was set at .05 for the analyses. Findings: Although there are many similarities in the population health status of the AD and RNG respondents to the 2010 BRFSS, there are clearly many more identifiable, statistically significant differences ($P < .05$) in relation to the domains of TFF. There are also significant differences in the relationships between measures of potential and realized access to care between AD and RNG; and within each category of military personnel (AD or RNG) in social determinants of health (age, gender, race, income). Implications for Military Nursing: Research is needed to further explore differences in population health status in AD and RNG found in analyses of BRFSS data in this study; and to develop TFF interventions and programs that can be used universally, to minimize and manage epidemiological factors and health services use behaviors that may be contributing to these differences.

15. SUBJECT TERMS
population health status, access to care, military personnel

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APPENDICES

Disclaimer:

This project was sponsored by the TriService Nursing Research Program, Uniformed Services University of the Health Sciences; however, the information or content and conclusions do not necessarily represent the official position or policy of, nor should any official endorsement be inferred by, the TriService Nursing Research Program, Uniformed Services University of the Health Sciences, the Department of Defense, or the U.S. Government.

Abstract

Purpose: To describe the relationship between the domains of Total Force Fitness (TFF) and explore the relationship between potential and realized access in military personnel completing the 2010 Behavioral Risk Factor Surveillance System Survey (BRFSS).

Design: Descriptive-exploratory study using secondary analysis of 2010 BRFSS data.

Methods: The sample was created by extracting data for all 2010 BRFSS participants responding "yes" to "currently being active duty" (AD) or "Reserves/National Guard" (RNG) on the *Veteran Status* demographic question.

Sample: 6134 respondents (1415 AD and 4719 RNG) to the 2010 BRFSS.

Analysis: Independent samples Chi-square and Mann-Whitney U were used to conduct bivariate analyses. Multiple logistic regression was used to determine the extent to which measures of potential access predicted measures of realized access. To obtain accurate variance estimates under the BRFSS complex survey design, data were analyzed using the IBM-SPSS Complex Samples Module (version 20, IBM, Chicago, IL). Significance level was set at .05 for the analyses.

Findings: Although there are many similarities in the population health status of the AD and RNG respondents to the 2010 BRFSS, there are clearly many more identifiable, statistically significant differences ($P < .05$) in relation to the domains of TFF. There are also significant differences in the relationships between measures of potential and realized access to care between AD and RNG; and within each category of military personnel (AD or RNG) in social determinants of health (age, gender, race, income).

Implications for Military Nursing: Research is needed to further explore differences in population health status in AD and RNG found in analyses of BRFSS data in this study; and to develop TFF interventions and programs that can be used universally, to minimize and manage epidemiological factors and health services use behaviors that may be contributing to these differences.

TSNRP Research Priorities that Study or Project Addresses

Primary Priority

Force Health Protection:	☒ Fit and ready force ☐ Deploy with and care for the warrior ☐ Care for all entrusted to our care
Nursing Competencies and Practice:	☐ Patient outcomes ☐ Quality and safety ☐ Translate research into practice/evidence-based practice ☐ Clinical excellence ☐ Knowledge management ☐ Education and training
Leadership, Ethics, and Mentoring:	☐ Health policy ☐ Recruitment and retention ☐ Preparing tomorrow's leaders ☐ Care of the caregiver
Other:	☐

Secondary Priority

Force Health Protection:	☐ Fit and ready force ☐ Deploy with and care for the warrior ☐ Care for all entrusted to our care
Nursing Competencies and Practice:	☒ Patient outcomes ☐ Quality and safety ☐ Translate research into practice/evidence-based practice ☐ Clinical excellence ☐ Knowledge management ☐ Education and training
Leadership, Ethics, and Mentoring:	☐ Health policy ☐ Recruitment and retention ☐ Preparing tomorrow's leaders ☐ Care of the caregiver
Other:	☐

Progress Towards Achievement of Specific Aims of the Study or Project

Findings related to each specific aim, research or study questions, and/or hypothesis:

The purpose of this exploratory, secondary analysis study was to describe the relationship between the domains of TFF and explore the relationship between potential and realized access in military personnel completing the 2010 Behavioral Risk Factor Surveillance System Survey (BRFSS).

Specific Aims:

1. Describe the relationship between domains of TFF in military personnel (active duty and Reserves/National Guard) completing the 2010 BRFSS.

2. Identify the relationship between potential (characteristics of the health delivery system and population at risk) and realized access (actual use of CPS) in military personnel completing the 2010 BRFSS.

3. Determine the extent to which realized access (actual use of CPS) is moderated by potential access (characteristics of the population at risk) in military personnel completing the 2010 BRFSS.

Findings Related <u>to the relationship between domains of TFF in military personnel (active duty and Reserves/National Guard) completing the 2010 BRFSS.</u>

Relationship of current findings to previous findings:

Behavioral Risk Factor Surveillance System Survey (BRFSS) [Department of Health and Human Services, Centers for Disease Control and Prevention (DHHS), 2010] measures in the core and optional modules in both even and odd years of survey administration fit the definitions put forth by the 2009 Total Force Fitness (TFF) Working Group (Land, 2010; Jonas, et. al, 2010) for all of the domains except spiritual fitness (see table 1 below). For example, in the 2009 BRFSS, measures are included for nutritional, physical, and psychological fitness Therefore, in terms of the criteria put forth by Firth and Smith (2010), the BRFSS is a potential "index model" for TFF. BRFSS data from the 2010 survey include measures and associated data fitting the TFF domain definitions and metrics for behavioral, medical, physical, psychological, and social fitness in military personnel. Our bivariate analyses (see table 2) of these measures supported the theorized interrelatedness of the TFF domains depicted in figure 1(below).

Table 1: Domains of Total Force Fitness (TFF) and 2010 BRFSS Measures

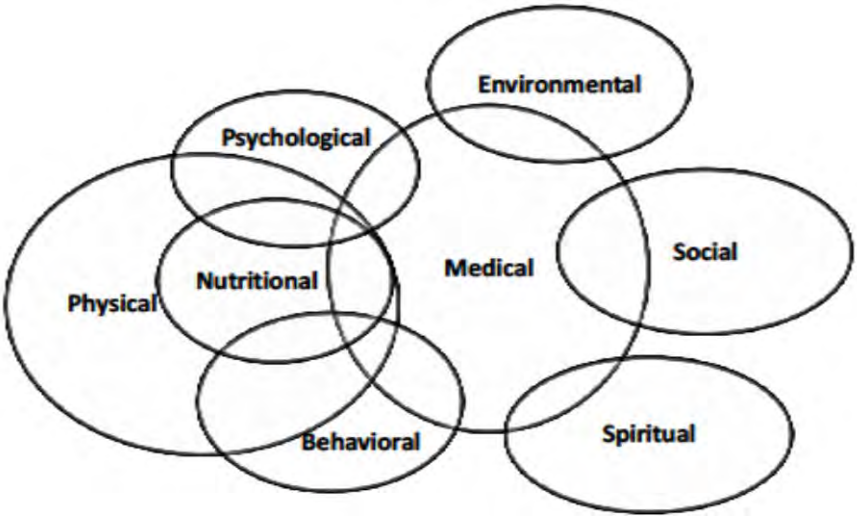
TFF Domain	Proposed TFF Measures	2010 BRFSS Measure (Data included in analyses)
Behavioral	Substance abuse, hygiene, risk mitigation	Tobacco Use; Alcohol use; Drinking & Driving; Risky Behaviors
Psychological	Coping, awareness, decision making, beliefs/appraisals, engagement	Perceived Health; Health Related Quality of Life (# of days in last 30 days mental, physical, or overall health was not good)
Social	Social support, task cohesion, social cohesion	Income, Ethnicity, Education, Marital Status; Emotional Support; Satisfaction with Life
Spiritual	Service values, positive beliefs, meaning making, ethical leadership, accommodate diversity	Spiritual fitness not included in 2010 BRFSS core questions.
Physical	Strength, endurance, flexibility, mobility	Age, Gender, Race, Engaged in Physical Exercise in the Last 30 days; Disability; BMI; Diagnosed with Chronic Disease: Diabetes, Asthma, Cardiovascular Disease
Nutritional	Food quality, nutrient requirements, supplement use, food choices	Nutritional fitness not included in 2010 BRFSS core questions.
Medical	Access, immunizations, screening, prophylaxis, dental	Insurance Coverage, Regular place of care, Routine Health and/or Dental Visit (last 12 months); Immunizations: Flu vaccine/mist last 12 months; Screening: Mammogram (women≥ 40); Pap Smear (women) Prostate (men ≥ 50); Colorectal (≥ 50); HIV/AIDS; Chronic Disease and Condition/Disease Management
Environmental	Heat/cold, attitude, noise, air quality	Environmental fitness not included in 2010 BRFSS core questions.

Table 2: Significant Relationships between Selected Measures of Total Force Fitness from the 2010 BRFSS within the Behavioral, Medical, Social, and Psychological Domains

TFF DOMAIN INDEPENDENT VARIABLE	BRFSS MEASURE	TFF DOMAIN DEPENDENT VARIABLE	BRFSS MEASURE	STATISTICAL FINDINGS
BEHAVIORAL FITNESS	SMOKELESS TOBACCO	SOCIAL FITNESS	EMOTIONAL SUPPORT	X^2 (3.751, 23007.833, N= 5809)= 23.401, p= .011
		MEDICAL FITNESS	TEETH CLEANED	X^2 (1, 6133, N= 5583)= 10.969, p= .011
MEDICAL FITNESS	ROUTINE CHECK UP	SOCIAL FITNESS	EMOTIONAL SUPPORT	X^2 (3.976, 24383.677, N= 5772)= 50.368, p= .001
	TEETHCLEANED		LIFE SATISFACTION	X^2 (2.945, 18061.990, N= 5842)= 55.820, p<.001
			EMOTIONAL SUPPORT	X^2 (3.984, 24433.985, N= 5326)= 188.845, p<.001
	ANNUAL DENTAL		LIFE SATISFACTION	X^2 (2.938, 18017.567, N= 5386)= 198.199, p<.001
			EMOTIONAL SUPPORT	X^2 (3.980, 24409.875, N= 5786)= 237.105, p<.001
	FLU SHOT		LIFE SATISFACTION	X^2 (2.921, 17913.992, N= 5856)= 151.690, p<.001
			EMOTIONAL SUPPORT	X^2 (3.980, 24411.707, N= 5784)= 71.244, p<.001
PHYSICAL FITNESS	EXERCISE	SOCIAL FITNESS	EMOTIONAL SUPPORT	X^2 (3.983, 24428.304, N= 5812)= 133.154, p<.001
			LIFE SATISFACTION	X^2 (2.940, 18033.891, N= 5882)= 158.404, p<.001
		MEDICAL FITNESS	TEETH CLEANED	X^2 (1, 6133, N= 5597)= 171.316, p<.001
			FLU SHOT	X^2 (1, 6133, N= 5978)= 11.568, p= .024
			ANNUAL DENTAL	X^2 (1, 6133, N= 6091)= 154.107, p<.001
PSYCHOLOGICAL FITNESS	PERCEIVED HEALTH	PHYSICAL FITNESS	EXERCISE	X^2 (3.998, 24521.824, N= 6103)= 616.788, p<.001
		MEDICAL FITNESS	ANNUAL DENTAL	X^2 (3.978, 24400.091, N= 6077)= 227.062, p<.001
			TEETH CLEANED	X^2 (3.974, 24374.193, N= 5583)= 222.239, p<.001
		SOCIAL FITNESS	LIFE SATISFACTION	X^2 (10.445, 64058.930, N= 5870)= 715.416, p<.001
			EMOTIONAL SUPPORT	X^2 (15.007, 92036.918, N= 5802)= 262.298, p<.001

* Note: Analyses conducted using Chi-Square in IBM®SPSS Complex Samples Module.

Figure 1: Theorized Interrelatedness between the Domains of TFF



Effect of problems or obstacles on the results:

The study sample was created in the Statistical Program for Social Sciences [SPSS] (version 20, IBM, Chicago, IL). To create the sample, data for all participants responding YES to being active duty (AD) or Reserves/National Guard (RNG) on the 2010 BRFSS were extracted into a data file, cleaned, coded, and prepared for analysis. Examination of the age variable using the "EXPLORE" function (descriptive statistics, extreme values, confidence intervals (CIs), 5% trimmed mean, histogram, Q-Q plots) in SPSS, demonstrated wide variation in the minimum and maximum age with grouping of age in two distinct groups (18-62 and 63-99). Because the *2010 BRFSS Data Comparability Report* (DHHS, 2010) clearly identified potential limitations associated with data coding, we decided to retain all age variable data and examine potential variation across the two distinct groups by summarizing and comparing demographic characteristics across the groups based on age.

Limitations:

Our analyses of BRFSS data and evaluation of BRFSS measures and methodology support the usefulness of the BRFSS as a "index model" for TFF; and as an exemplar in terms of development, validation, index administration and evolution, utility for military populations, and interrelatedness to the concept of TFF. However, there are limitations that should be considered when interpreting our results. There are limitations associated with re-analysis of existing data that could create methodological and interpretative issues if not addressed (Bibb, 2007; Doolan & Froelicher, 2009; Kneipp & Yarandi, 2002). To that end, our methodological approach to secondary analyses was designed to ensure "representativeness" of the target population and "quality" of the data. Complex samples statistical programs were used in conducting analyses in order to obtain accurate variance estimates under the BRFSS complex samples design. In maximizing representativeness, all cases of AD and RNG military personnel responding to the 2010 BRFSS were included in the analyses. However, only those military personnel with telephones had an opportunity to participate in the telephone administered BRFSS.

The BRFSS is a well-established, publicly available data source and many BRFSS questions have been shown to have moderate to high reliability. BRFSS data are self-reported; and frequencies derived from our analysis of data may be under or overestimated. Still, even though self-reported data are limited in terms of accuracy and validity, the self-report method is both versatile and direct when collecting data that cannot be observed or measured physiologically, such as perceived health status and health risks/behaviors (Polit & Beck, 2010).

With the exception of age and education, analyses of demographic characteristics for AD and RNG responding to the 2010 BRFSS are similar to the analyses for AD and RNG in the military community profile (see tables 3, 4 and 5 below). In both our analyses and the military community profile, the majority of the respondents were White, male, non-Hispanic and married. The majority of respondents in the military community profile completed grade 12, as compared to the majority of respondents to the 2010 BRFSS, who reported completing four or more years of college. The difference in educational preparation for BRFSS respondents as compared to respondents in the military community profile may be related to BRFSS survey non-response bias (differences in respondents who participated and those who declined to participate). The difference in mean age between the BRFSS and the military community profile is notable, and is attributed to errors that may relate to coding.

Table 3: TFF Epidemiologic Profile Mind Category Measures from 2010 BRFSS for AD and RNG Military Personnel

Determinant of Health	TFF Domain	Epidemiological Factor	AD N=1415	RNG N=4719	*P Value*
			n % CI (95%)	n % CI (95%)	
Behavioral (personal choices of lifestyle & habits)	**Behavioral**	**Smoke Cigarettes** YES NO	736 29% (24-35) 71% (65-76)	2354 27% (24-30) 73% (70-76)	.535
		Use Smokeless Tobacco YES NO	1405 6% (5-8) 94% (92-95%)	4707 5% (3-5) 95% (95-96%)	.012*
Psychological (well-being)	**Psychological**	**Perception of Health** Excellent Very Good Good Fair Poor	1411 33% (29-37) 36% (32-40) 23% (20-27) 6% (4-8) 2% (1-4)	4700 16% (15-18) 33% (31-35) 31% (29-33) 14% (13-15) 6% (5-7)	<.001*
Social (income, education, occupation, social support, ethnicity)	**Social**	**Hispanic/Latino** YES NO	1408 10% (8-13) 90% (87-92)	4694 5% (4-7) 95% (93-96)	<.001*
		Highest Educational Level < High School Grade 12 or GED College 1 to 3 Years College 4 or More Years	1411 2% (1-4) 22% (19-26) 34% (31-38) 41% (38-45)	4704 6% (5-8) 31% (29-33) 25% (23-27) 38% (36-40)	<.001*
		Marital Status Married Divorced Widowed Separated Never Married Member of an Unmarried Couple	1412 76% (73-79) 8% (6-10) 4% (3-6) 1% (1-2) 10% (8-12) 1% (1-2)	4701 66% (61-66) 14% (13-16) 9% (8-11) 1% (1-2) 10% (9-12) 2% (1-2)	<.001*

Note: Epidemiological Factors are based on measures from the 2010 BRFSS Survey

Table 4: TFF Epidemiologic Profile Body Category Measures from 2010 BRFSS for AD and RNG Military Personnel

Determinant of Health	TFF Domain	Epidemiological Factor	AD N=1415 n % CI (95%)	RNG N=4719 n % CI (95%)	*P Value*
Biological & Genetic (genetic composition, body response)	Physical	Age	1404 Mean = 43 SD = 16	4680 Mean = 61 SD = 15	<.001**
		Gender Male Female	1415 81% (78-84) 19% (16-22%)	4719 78% (76-80) 22% (20-24)	.087
		Race White Black All Other Races	1407 73% (69-76) 24% (21-28) 3% (2-5)	4688 69% (67-71) 27% (25-30) 4% (3-5)	.307
Health care (access to care; primary, secondary, tertiary prevention; quantity & quality of health services)	Medical	Have Health Care Coverage YES NO	1412 95% (93-96) 5% (4-8)	4713 91% (89-92) 9% (8-11)	.003*
		Have at Least One Primary Care Provider YES NO	1405 77% (73-80) 23% (20-27)	4709 89% (88-90) 11% (10-12)	<.001*
		Had routine check-up within past 12 months YES NO	1408 85% (82-88) 15% (12-18)	4677 72% (70-74) 28% (26-30)	<.001*
		Visited dentist within past 12 months YES NO	1410 87% (84-90) 13% (10-16)	4688 69% (67-71) 31% (29-33)	<.001*

Note: Epidemiological Factors are based on measures from the 2010 BRFSS Survey
Weighted Frequencies derived using SPSS Complex Samples; Descriptive Statistics derived using SPSS.
* P < .05 with Independent Samples Chi Square ; ** P < .05 with Mann-Whitney U

Table 5: Comparison of Demographic Population Data for the Year 2010 from United States and Department of Defense

Demographic Characteristics		United States Population Data Comparison	Department of Defense (DoD) Population Data Comparison	
			Active Duty[b]	Reserve/National Guard[b]
Age	Average Age	37	29	32
Gender	Male	49%	86%	82%
	Female	51%	14%	18%
Race	White	72%	70%	76%
	Black or African American	13%	17%	15%
	Asian	5%	4%	3%
	Native Hawaiian or Other Pacific Islander	0%	1%	1%
	American Indian or Alaskan Native	-	2%	1%
	Other Race	6%	5%	4%
Hispanic Ethnicity		16%	11%	10%
Highest Education				
	Less than High School	13%	1%	3%
	Grade 12	31%	80% (less than bachelors)	77% (less than bachelors)
	Some College and Associates Degree	26%	-	-
	College 4 or More Years	30%	18%	19%
Current Marital Status		Male / Female		
	Married	19% / 18%	56%	48%
	Divorced	9% / 10%	4%	7%
	Widowed	4% / 8%	-	-
	Never Married	30% / 24%	39%	44%

Note: [a] United States Census Bureau 2010 Census Data. Available from http://2010.census.gov/2010census/

[b] Department of Defense. 2010 Demographics: Profile of the Military Community. Retrieved from http://brainhealth.army.mil/SBH/Shared%20Documents/2010_Demographics_Report.pdf

Conclusion:

From both an analytic and evaluative perspective, the results of our analysis support the usefulness of the BRFSS survey as a potential "index model" and exemplar for TFF. Data for measures of TFF were not represented for all active duty (AD) and Reserve/National Guard (RNG) responding to the 2010 BRFSS in sufficient quantity to evaluate interrelatedness between all eight domains. However, our analyses with five of the domains support the utility of the BRFSS for military populations. Further research is needed to determine the usefulness of the BRFSS in practice settings in assessing achievement of TFF in military personnel.

Findings Related to the relationship between potential (characteristics of the health delivery system and population at risk) and realized access (actual use of CPS) in military personnel completing the 2010 BRFSS.

Relationship of current findings to previous findings:

The results of the analyses support the existence of variations in having health insurance coverage and actual use of health services in active duty military personnel completing the 2010 BRFSS. The analyses were conducted using data from survey respondents who reported "currently being on active duty", however 5% of the 1415 participants responded "no" to "having health insurance coverage"; and 22% responded no to "having at least one health care provider". Although Section 1074 of Title 10 of the United States Code establishes universal health coverage for medical and dental care for active duty military personnel, 4% of the active duty survey respondents reported that cost had prevented the receipt of health care within the last 12 months. Given the congressionally mandated structure of the health policy ensuring universal health coverage for military personnel, the survey responses for these participants are most likely attributed to perceptions of availability and appropriateness of health services, rather than to policy. However, when the survey responses from these military personnel are benchmarked against the Healthy People 2020 targets for "health insurance" (100%) and "primary provider" (100%), the World Health Organization [WHO] (2012) financial and structural criteria for universal health coverage are not met (DHHS, 2013).

Statistically significant variations in the relationships between measures of potential access and measures of realized access (routine exam, dental exam) were associated which predisposing, enabling, and need characteristics of the population. Although these variations support the existence of barriers to access that are not related to universal health coverage, additional research is needed to validate these variations, and to identify moderators of actual use of health services, in populations with universal health coverage (see table 6 below).

Table 6: Relationships between Potential and Realized Access to Care

Potential Access: Characteristics of the Population at Risk				Realized Access: Objective Indicators	
Characteristic		*n*	%	Routine Exam *P* value	Dental Exam *P* value
PREDISPOSING					
Age in years:	$n = 1404$ $M = 43$ SD = 15.81			.234	<.001**
Gender:	Male	1144	81%		
	Female	271	19%	.038	.125
Race:	White	1017	72%		
	Black	357	25%	.003*	.503
	All other Races	33	2%		
Hispanic/Latino	Yes	117	8%		
	No	1291	92%	.643	.532
Marital status:	Married or Member of a Married Couple	1050	74%		
	Divorced, Separated, Widowed	211	15%	.327	.193
	Never Married	151	11%		
Education:	Grade 12 or GED	308	22%		
	1-3 years of College	467	34%	.285	<.001*
	College 4 years or more	606	44%		
ENABLING					
Health Insurance Coverage					
	Yes	1346	95%	.058	.023*
	No	66	5%		
Have at Least One Health Care Provider					
	Yes	1089	78%	<.001	.554
	No	316	22%		
NEED					
Perceived Health Status:	Excellent	456	32%		
	Very good or Good	841	60%	.046*	<.001
	Fair or Poor	114	8%		
Limitation of Activities Due to Health					
	Yes	223	16%	.350	.005*
	No	1186	84%		

Note: Weighted Frequencies derived using SPSS Complex Samples; Descriptive Statistics derived using SPSS.
* $P < .05$ with Chi Square Test of Independence; ** $P < .05$ with Mann-Whitney U

The results of these analyses provide insight into the health care utilization patterns of active duty military personnel responding to the 2010 BRFSS; and establish a basis for conducting access to care studies in populations with universal health coverage. The demographic profile of the sample used in the analyses is not representative of the total active duty force. When compared to the DoD total active duty force, the respondents to the 2010 BRFSS were older (M=43) and had a higher educational level (60% had 4 years or more of college). The profile of the sample is more consistent with the profile for active duty officers presented in the 2011 demographic profile (DoD, 2012). It is likely that a large proportion of the 2010 BRFSS survey respondents were active duty military officers. However, enlisted and officer members of the military have the same level of universal health coverage.

Effect of problems or obstacles on the results:

No problems or obstacles were encountered with this aim.

Limitations:

This study was limited by the use of existing, self- report data**.** The methodological issues associated with use of existing data were addressed by: including all cases for active duty military personnel; carefully cleaning and coding the BRFSS data to ensure maximum data quality; and conducting analyses using a complex samples statistical program in order to obtain

accurate variance estimates under the BRFSS complex samples design. Self -report methods are limited because of issues related to validity and accuracy. However, the majority of nursing studies are conducted using the self- report method, which is "strong in directness and versatility" (Polit & Beck, 2008, p.369). Because BRFSS data are self-reported, frequencies derived from these analyses may be under or overestimated. In addition, responder-bias may have contributed to differences in the demographic profile of military personnel presented in the *2011 Demographics: Profile of the Military Community*, and the demographic profile of the sample for these analyses. In addition, because the BRFSS is administered by telephone, active duty military personnel without telephones may not have been included in the sampling frame.

Conclusion:

Variations in the relationships between measures of potential and realized access cannot be explained by lack of representativeness of the active duty military sample. The results of these analyses support the need to consider the impact of the multidimensionality of the concept of access when planning and delivering care; conducting research; and developing health policy for populations with universal health coverage.

Findings Related to the extent to which realized access (actual use of CPS) is moderated by potential access (characteristics of the population at risk) in military personnel completing the 2010 BRFSS.

Relationship of current findings to previous findings:

A test of an overall model with "annual exam within the past 12 months" as an outcome variable and measures of predisposing, enabling, and need potential access factors as predictors against a "YES" response was statistically reliable (Wald F [16, 1226, N = 1242] =3.705, p <.001). The overall model predicted 85.2% of the responses correctly; and the Nagelkerke Pseudo R^2 was .163. The predictor variables race, primary provider, and perceived health, reliably distinguished between a "yes" or "no" response on annual exam within the past 12 months. White respondents were more than twice as likely to respond "Yes" (Odds ratio [OR] =3.08, 95% confidence interval [CI], 1.10-8.58) than were Black respondents ([OR] =1.48, 95% [CI], .490- 4.49). Respondents with at least one primary provider were almost four times more likely to respond "Yes" ([OR] =3.75, 95% (CI), 2.20-6.38) than those without a primary provider (reference). Respondents who perceived their health as "excellent" ([OR] =3.08, 95% (CI), 1.15-8.23) or "very good to good" ([OR] =2.78, 95% (CI), 1.20- 6.47) were about three times more likely to respond "Yes" than were respondents who perceived their health as "fair to poor" (reference).

A test of an overall model with "visited dentist within the past 12 months" as an outcome variable and measures of predisposing, enabling, and need potential access factors as predictors against a "YES" response was also statistically reliable (Wald F [16, 1228, N = 1244] =3.620, p <.001). The overall model predicted 89% of the responses correctly; and the Nagelkerke Pseudo R^2 was .233. The predictor variables income, chronic disease, and age ([OR]=.972, 95% (CI), .956-.989), reliably distinguished between a "yes" or "no" response on "visited dentist within the

past 12 months". Respondents reporting annual household incomes of less than or equal to $25,000 ([OR] =.305, 95% [CI], .139-.670) and greater than $25,000 and less than or equal to $50,000 ([OR] =.372, 95% [CI], .185-.750) were less likely to respond "Yes" than respondents reporting annual household income levels greater than $50,000 (reference). Respondents who had been told that they had a chronic condition (diabetes, heart disease, stroke, asthma) by a health professional were less likely to respond "Yes" ([OR]) =.460, 95% (CI), .237-.894) than those who had not been told that they had a chronic condition (reference).

The results of these analyses provide insight into the health care utilization patterns of active duty military personnel responding to the 2010 BRFSS; and establish a basis for conducting access to care studies in populations with universal health coverage. The results of these analyses also support the need to consider the impact of the multidimensionality of the concept of access when planning and delivering care; conducting research; and developing health policy for populations with universal health coverage.

Effect of problems or obstacles on the results:

No problems or obstacles were encountered with this aim.

Limitations:

There are limitations associated with re-analysis of existing data that could create methodological and interpretative issues if not addressed (Bibb, 2007; Doolan & Froelicher, 2009; Kneipp & Yarandi, 2002). To that end, our methodological approach to secondary analyses was designed to ensure "representativeness" of the target population and "quality" of the data. Complex samples statistical programs were used in conducting analyses in order to obtain accurate variance estimates under the BRFSS complex samples design. In maximizing representativeness, all cases of AD and RNG military personnel responding to the 2010 BRFSS were included in the analyses. However, only those military personnel with telephones had an opportunity to participate in the telephone administered BRFSS.

The BRFSS is a well-established, publicly available data source and many BRFSS questions have been shown to have moderate to high reliability. BRFSS data are self-reported; and frequencies derived from our analysis of data may be under or overestimated. Still, even though self-reported data are limited in terms of accuracy and validity, the self-report method is both versatile and direct when collecting data that cannot be observed or measured physiologically, such as perceived health status and health risks/behaviors (Polit & Beck, 2010).

Conclusion:

Having health care coverage was not a significant predictor of a "YES" response for "routine exam within the last 12 months" or "visited the dentist within the last 12 months. Variations in use of health services in this sample of military personnel were related to predisposing, enabling, and need measures of potential access. Additional research is needed to explore relationships between potential and realized access to health services in populations with universal health coverage.

Significance of Study or Project Results to Military Nursing

Within the Department of Defense (DoD), force health protection (FHP) and population health (PH) are operationalized through two DoD directives. DoD directive *6200.04 Force Health Protection* establishes policy that mandates promotion and improvement of health through implementation and sustainment of primary, secondary, and tertiary CPS. DoD directive *1010.10 Health Promotion and Disease/Injury Prevention* emphasizes use of the *Healthy People Leading Health Indicators* (LHIs) to create a culture that values health and fitness and empowers individuals and organizations to exemplify those values in achieving optimal health. As the DoD moves forward in the 21st century to integrate TFF into the current FHP culture, making PH improvement programs universally available to both the active and reserve components of the military is a major consideration in strengthening the total force. The domains of TFF provide an excellent model for structuring epidemiological profiles to study the distribution and determinants of health and disease, as well as use of CPS by military personnel.

Figure 2 shows how development of TFF epidemiological profiles can be used to increase awareness of the distribution and determinants of health and disease; assess the use of primary, secondary, and tertiary CPS; set priorities for health programs, services and policies; and guide the development, implementation, and monitoring of programs, services, and policies initiated to improve health. The profile is characterized as "TFF" and "epidemiological" because the information is presented in a manner that describes population characteristics, health risks, behaviors, and health services utilization patterns organized into categories around the TFF domains and determinants of PH. The synthesis of analyses from this study demonstrates the **e**ffectiveness of using BRFSS measures and data to develop TFF epidemiological profiles.

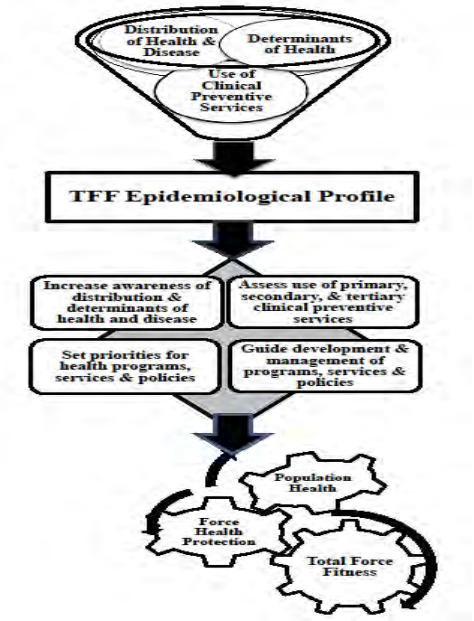


Figure 2: TFF Epidemiological Profile Development

PH and clinical prevention are major components of the multifarious practice, research, education, leadership and advocacy role of the military nurse. DoD MHS nurses involved in primary care, health promotion, and population health are key stakeholders in assessing PH and designing programs and policies to support achievement of TFF. Findings from this study can be used to guide generation of evidence to increase awareness of the distribution and determinants of health and disease; assess the use of primary, secondary, and tertiary CPS; set priorities for PH health programs, services and policies; and guide the development, implementation, and monitoring of programs, services, and policies initiated to achieve TFF**.**

Changes in Clinical Practice, Leadership, Management, Education, Policy, and/or Military Doctrine that Resulted from Study or Project

Our preliminary work clearly establishes the Behavioral Risk Factor Surveillance System (BRFFS) as a potential index model for the assessment of TFF. In addition, our analyses of existing data from Active Duty (AD) and Reserve/National Guard (RNG) military personnel responding to the 2010 BRFSS, demonstrates the effectiveness of using BRFSS measures and data to develop TFF epidemiological profiles to assess population health (PH). This preliminary work provides a basis for conducting research to determine which existing PH programs have potential to support achievement of TFF. The results of future studies can provide evidence to guide changes in policy to support provision of universally available TFF programs for the active and reserve components of the total force.

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Summary of Dissemination

Type of Dissemination	Citation	Date and Source of Approval for Public Release
Publications	Bibb, S. C., Mollah, F. N., & Morgan, B. J. (2014). Evaluation of the behavioral risk factor surveillance System as a potential index model for total force fitness. *Military Medicine, 179* (5), 529-539.	Triservice Nursing Research Program (21 August 2013)
Podium Presentations	Accepted: Bibb, S. C. (For September 2014 Presentation). *2014 National State of the Science Congress on Nursing Research,* September 18-20, 2014, Examining the Relationship between Potential and Realized Access to Care in a Population of Military Personnel with Universal Health Coverage	Triservice Nursing Research Program (7 March 2014)
Poster Presentations	Mollah, F. N. & Bibb, S. C. (May 2014). *USU Research Days Poster Presentations.* "Comparing the Population Health Status of Active Duty and Reserve/ National Guard Military Personnel Using Total Force Fitness Epidemiological Profiles".	Triservice Nursing Research Program (7 March 2014)
	Bibb, S. C., Mollah, F. N., Ling, C. G., & Morgan, B. J. (June 2014). *Academy Health 2014 Annual Research Meeting (ARM),* June 8-10 at the San Diego Convention Center. The Relationship between Potential and Realized Access in Military Personnel Responding to the 2010 Behavioral Risk Factor Surveillance System Survey: Results of Analysis of Data from a Sample Population with Universal Health Coverage	Triservice Nursing Research Program (7 March 2014)

Reportable Outcomes

Reportable Outcome	Detailed Description
Applied for Patent	None
Issued a Patent	None
Developed a cell line	None
Developed a tissue or serum repository	None
Developed a data registry	None

Recruitment and Retention Table

This study did not involve recruitment or retention. The research study was conducted using existing data from the 2010 Behavioral Risk Factor Surveillance System Survey (BRFSS).

Demographic Characteristics of the Sample

Characteristic	
Age (yrs)	56 ± .336 (SE)
Women, n (%)	1266 (22%)
Race	
White, n (%)	4358 (70%)
Black, n (%)	1584 (27%)
Other, n (%)	153 (3%)
Hispanic	
Yes, n (%)	327 (7%)
No, n (%)	5775 (93%)
Service Component	
Active Duty, n (%)	1415 (23%)
Reserve/National Guard, n (%)	4719 (77%)

Final Budget Report

There are remaining personnel funds because the Research Associate on the Grant Proposal left the project and a new Research Associate was recruited and hired. Funding started in July 2012; the NEW Research Associate was not hired until September 2014.

There are remaining travel funds because one collaborator relocated to the PI's local area and travels funds were not required to support face-to-face meetings.

Appendices

Appendix 1:Manuscript Approval Forms dated 21 August 2014 (TSNRP)

Appendix 2: Abstract Approval Forms dated 7 March 2014 (TSNRP)

Appendix 3: Manuscript Published in Military Medicine July 2014

Appendix 4: Abstracts Accepted:

- **Uniformed Services University Research Days (May 2014)**
- **Academy Health 2014 Annual Research Meeting (ARM), June 8-10 at the San Diego Convention Center.**
- **2014 National State of the Science Congress on Nursing Research, September 18-20, 2014, Washington, DC.**

Appendix 5: Posters Presented:

- **Uniformed Services University Research Days (May 2014)**
- **Academy Health 2014 Annual Research Meeting (ARM), June 8-10 at the San Diego Convention Center.**